CLAIMS

1. An optical pickup that emits a primary laser light and a secondary laser light having different primary and secondary wavelength respectively that are used for recording to an information recording medium, the optical pickup comprising:

a primary laser light source emitting the primary laser light;

an integrated device further comprising a secondary laser light source emitting the secondary laser light and light receiving elements as light reception means, the secondary laser light source and light receiving elements being grouped together as an integrated aggregate on the main surface of a substrate; and

laser light optical path separating elements,

wherein for the outward optical path of the primary laser light towards the information recording medium, the primary laser light follows a first optical path joining the primary laser light source and the laser light optical path separating elements, and after entering the laser light optical path separating elements is emitted therefrom, thereafter the primary laser light follows a second optical path joining the laser light optical path separating elements and the information recording medium to be irradiated on to the information recording medium,

wherein for the outward optical path of the secondary laser light towards the information recording medium, the secondary laser light follows a third optical path joining the integrated device and the laser light optical path separating elements, and after entering the laser light optical path separating elements is emitted therefrom, thereafter the secondary laser light follows the second optical path and is emitted to the information recording medium, and

wherein for the return optical path of the primary laser light and the secondary laser light returning from the information recording medium, the primary and secondary laser lights follow the second optical path to enter the laser light optical path separating elements and after being emitted therefrom follow the third optical path entering the light receiving means of the integrated device.

2. The optical pickup according to claim 1 wherein at least one from among the

primary laser light and the secondary laser light is of sufficient power to be used for recording.

3. The optical pickup according to claim 1 wherein the laser light optical path separating elements are partially transmissive for the primary laser light so as to partially pass and partially reflect the primary laser light and either substantially totally transmissive or substantially totally reflective for the secondary laser light wherein the primary laser light and the secondary laser light follow the second optical path to be emitted to the information recording medium side and the return optical path of the primary laser light and the secondary laser light from the information recording medium follows the third optical path to be emitted to the integrated device side.

4. The optical pickup according to claims 1 to 3 wherein the laser light optical path separating elements reflect outward path light emitted from the primary laser light source, pass outward path light emitted from the secondary laser light source and pass return path light reflected from the information recording medium emitted from the primary laser light source and return path light reflected from the information recording medium emitted from the secondary laser light source.

5. The optical pickup according to claim 4 wherein the laser light optical path separating elements have a separating ratio wherein between 70 percent and 90 percent of the primary laser light is reflected and the remainder is passed.

6. The optical pickup according to any of claims 1 to 5 wherein the laser light optical path separating elements comprise a planar member wherein the surface into which the primary laser light is injected and the surface from which the primary laser light is emitted to the information recording medium and into which return path light of the primary laser light from the information recording medium is injected are the same surface.

7. The optical pickup according to claim 6 wherein in relation to the laser light

optical path separating elements the angle of incidence of the secondary laser light emitted from the secondary laser light source is less than 40 degrees and the thickness of the planar member is less than approximately 1 mm.

8. The optical pickup according to any of claims 1 to 5 wherein the laser light optical path separating elements are a polarized light beam splitter providing a first surface into which the primary laser light is injected, a second surface from which the primary laser light is emitted to the information recording medium side and into which the primary laser light from the information recording medium is injected and a third surface from which return path light is emitted to the integrated device side.

9. The optical pickup according to any of claims 1 to 8 wherein the laser light optical path separating elements separate the primary laser light based on the condition of polarization thereof.

10. The optical pickup according to claim 9 wherein the polarized light beam splitter has polarization dependency in respect of the first wavelength only, such that the ratio of light passed depends on the polarization thereof, passes from 10 percent to 30 percent of incident polarized light from the primary laser light source and passes from 20 percent to 60 percent of polarized light orthogonal thereto.

11. The optical pickup according to claim 9 wherein the polarized light beam splitter has polarization dependency in respect of the first wavelength only, such that the ratio of light passed depends on the polarization thereof, passes from 10 percent to 30 percent of incident polarized light from the primary laser light source and passes from 20 percent to 40 percent of polarized light orthogonal thereto.

12. The optical pickup according to claim 9 wherein the polarized light beam splitter has polarization dependency in respect of the first wavelength only, such that the ratio of light passed depends on the polarization thereof, and where the ratio of incident polarized light from the primary laser light source that is passed is T_i and the ratio of

polarized light orthogonal thereto that is passed is T_v, each pass ratio T_i and T_v should fulfill the conditions $10\% \leq T_i \leq 30\%$ and $T_v \leq 2T_i$.

13. The optical pickup according to any of claims 1 to 12 wherein the primary laser light is of a longer wavelength than the secondary laser light, and is of sufficient power for recording, and the laser light optical path separating elements separate the primary laser light regardless of the condition of polarization thereof.

14. The optical pickup according to any of claims 1 to 13 wherein the primary laser light is of a wavelength of the 780 nm band and the secondary laser light is of a wavelength of the 650 nm band.

15. An optical pickup comprising:

a primary laser light source for emitting a primary laser light having a first wavelength and having sufficient power for recording;

an integrated device further comprising a secondary laser light source for emitting a secondary laser light having a second wavelength that is longer than the first wavelength and having sufficient power for recording as well as light receiving means for receiving light of the primary and secondary laser lights; and

laser light optical path separating elements that are a polarized light beam splitter further comprising a first surface into which the first laser light emitted from the primary laser light source is injected, that has polarization selectivity in respect of the primary laser light having the first wavelength and no polarization selectivity in respect of the secondary laser light having the second wavelength, a second surface from which the primary laser light is emitted to the information recording medium side and into which return path light of the primary laser light from the information recording medium side is injected and a third surface from which the return path light is emitted to the integrated device side.

16. The optical pickup according to claim 15 wherein the laser light optical path separating elements pass all primary laser light having P polarization in relation to thereto,

while reflecting all primary laser light having S polarization and reflecting all of the secondary laser light regardless of the polarization thereof.

17. The optical pickup according to claim 15 wherein the laser light optical path separating elements pass all of the primary laser light having P polarization in relation thereto, while reflecting all of the primary laser light having S polarization and passing all of the secondary laser light regardless of the polarization thereof.

18. The optical pickup according to claim 15 wherein the laser light optical path separating elements have a fourth surface that passes, from among the primary laser light, P polarized light components in relation to this polarized light beam splitter, passes from 5 percent to 20 percent of S polarized light components while reflecting the remainder, reflects all of the secondary laser light regardless of the direction of polarization thereof and emits from 5 percent to 20 percent of the primary laser light to light quantity detecting elements in the forward direction thereto.

19. The optical pickup according to claim 15 wherein the laser light optical path separating elements of this optical pickup pass primary laser light emitted from the primary laser light source toward the information recording medium side and reflect return path light of the primary laser light from the information recording medium to the integrated device side, reflect the secondary laser light from the secondary laser light source to the information recording medium side and reflect the secondary laser light from the information recording medium to the integrated device side, and the light receiving elements receive light that is return path light of the primary laser light or the secondary laser light from the information recording medium, emitted from the laser light optical path separating elements.

20. The optical pickup according to claim 19 wherein the laser light optical path separating elements function, in relation to wavelengths of the primary laser light, to pass P polarized light and to reflect S polarized light, and function, in relation to wavelengths of the secondary laser light, as a total light reflecting prism reflecting both P polarized

light and S polarized light.

21. The optical pickup according to claim 19 wherein the primary laser light source, the integrated device and the laser light optical path separating elements are disposed such that the optical axes connecting therebetween are positioned on the same plane, the primary laser light source is disposed such that the direction of polarization of the primary laser light is parallel to that plane and the secondary laser light source is disposed such that the direction of polarization of the secondary laser light is perpendicular to that plane.

22. The optical pickup according to either of claim 18 or claim 19 wherein a collimator lens that collimates the primary laser light and the secondary laser light traveling from the laser light optical path separating elements to the objective lens is disposed between the laser light optical path separating elements and objective lens.

23. The optical pickup according to claim 15 wherein the laser light optical path separating elements reflect the primary laser light emitted from the primary laser light source to the information recording medium side, pass return path light of the primary laser light from the information recording medium to the integrated device side, pass the secondary laser light from the secondary laser light source to the information recording medium side and pass return path light of the secondary laser light from the information recording medium to the integrated device side, and the light receiving means receives return path light of the primary laser light source and the secondary laser light source from the information recording medium, emitted from the laser light optical path separating elements.

24. The optical pickup according to claim 23 wherein the laser light optical path separating elements function, in relation to wavelengths of the primary laser light, to reflect S polarized light and to pass P polarized light, and function, in relation to wavelengths of the secondary laser light, as a light passing member that passes both P polarized light and S polarized light.

25. The optical pickup according to any of claims 1 to 24 wherein a primary collimator lens for collimating the primary laser light from the primary laser light source is disposed between the primary laser light source and the laser light optical path separating elements and a secondary collimator lens for collimating the secondary laser light from the secondary laser light source is disposed between the integrated device and the laser light optical path separating elements.

26. The optical pickup according to claim 25 wherein the laser light optical path separating elements of this optical pickup have an inclined surface that, in order to make the plane of incidence of a parallel light beam of the primary laser light made parallel by the first collimator lens into a circular form, is inclined in relation to the optical axis of that parallel light beam.

27. The optical pickup according to any of claims 15 to 26 wherein the primary laser light has a wavelength of the 650 nm band and that the secondary laser light has a wavelength of the 780 nm band.

28. The optical pickup according to any of claims 1 to 27 wherein the primary laser light source and the integrated device are disposed so as to be physically mutually separated.

29. The optical pickup according to any of claims 1 to 27 wherein the long axial direction of the intensity distribution of the primary laser light emitted from the primary laser light source is in the plane including the first to third optical paths.

30. The optical pickup according to any of claims 1 to 29 wherein the light separating surface of the laser light optical path separating elements is inclined approximately at an angle of 45 degrees in relation to the angle of incidence of the primary laser light from the primary laser light source or the secondary laser light from the secondary laser light source.

31. The optical pickup according to any of claims 1 to 29 wherein the laser light optical path separating elements operate in respect of the secondary laser light such that the ratio of P polarized light that is passed is greater than the ratio of S polarized light.